

Archaeological Overview Assessment

Red Mountain Gold Project
Stewart, British Columbia

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Management Summary

This report is an archaeological overview assessment (AOA) of IDM Mining Ltd.'s proposed Red Mountain Gold Project, an underground gold-silver mine near the head of Bitter Creek and the Bromley glacier, 17 km east of the District of Stewart, 188 km north of the City of Prince Rupert.

The AOA includes a review of archaeological and historical data, and an analysis of the physical attributes of the project area. Recent studies in alpine ice-patch archaeology are considered along with more typical criteria for assessing the potential for culturally modified trees and buried archaeological remains or surface features associated with well-drained, level landforms adjacent to drainages and water bodies. The preliminary assessments of archaeological potential are qualified by an assessment of past land use in the project area which includes underground and placer mining, mineral exploration activities, as well as road building which has occurred adjacent to most project components.

No previously recorded archaeological sites are located within the proposed project area. Only five archeological sites (including one legacy aircraft wreck) are located within 30 km of the project.

Preliminary field reconnaissances are recommended to ground truth predictions about the existence of remnant creek terraces in the Bitter Creek valley and recently ice-bound artifacts in the alpine at the mine site proper. No further archaeological work is recommended for the remaining developments lands due to steeply sloping terrain or significant man-made or natural disturbance that would preclude detection of archaeological remains.

The Project is located within the Nass Wildlife Area as set out in the *Nisga'a Final Agreement* (NFA). Pursuant to the NFA, the Nisga'a Nation has treaty rights to the management and harvesting of fish and wildlife within the Nass Wildlife Area.

It is important to note this assessment is intended to identify physical archaeological evidence of past human activity protected under the *Heritage Conservation Act*. It does not address traditional land use or other heritage concerns of the First Nations people with asserted traditional territory in the study area

Table of Contents

Credits	iii
Management Summary	iv
Table of Contents	v
1 Introduction	1
1.1 Archaeological Site Protection	1
1.2 Archaeological Overview Assessment (AOA)	1
1.3 Report	1
2 Proposed Project	2
3 Study Area	5
3.1 Natural Setting	5
3.2 Cultural Setting	6
3.3 Archaeological Setting	7
3.4 Archaeological Site Types	8
3.5 Historical Setting	10
4 Methodology	11
4.1 Documentary Research	11
4.1.1 Provincial Archaeological Report Library and Permit Report Review	11
4.1.2 Remote Access to Archaeological Data and Heritage Resource Inventory Application	11
4.1.3 Northwest British Columbia Mining Industry Documents Search	11
4.2 Review and Analysis of Topographical Data	12
4.3 Archaeological Potential	12
4.4 Recommendations	12
5 Results	13
5.1 Documented Archaeological Sites and Trails	13
5.2 Historical Records Search	13
5.3 Recent Archaeological Studies	14
5.3.1 AIAs of Ministry of Transportation and Infrastructure Gravel Pits, Permit 2008-0181	14
5.3.2 AIA of Bravo Gold Corp.'s Homestake Ridge Access Road, Permit 2010-0274	15
5.3.3 AIA of Pretivm Resources Inc.'s Snowfield and Brucejack Project, permit 2010-0255	15
5.4 Terrain Analysis	16
5.5 Archaeological Potential	16
6 Conclusions and Recommendations	18
7 References Cited and Consulted	1

List of Figures

Figure 1: Stewart Area	3
Figure 2: Location of Red Mountain Gold Project Components	4
Figure 3: Red Mountain Gold Project – Mine Facilities	20
Figure 4: Red Mountain Gold Project – Rio Blanco to Hartley Gulch	22
Figure 5: Red Mountain Gold Project – Hartley Gulch to Roosevelt Creek	24
Figure 6: Red Mountain Gold Project – Cable Creek to Crabtree Creek	26
Figure 7: Red Mountain Gold Project – Highway 37A Junction	28
Figure 8: Red Mountain Gold Project – Highway 37A to Stewart	30

List of Photographs

Image 1: View northeast to Red Mountain (IDM Mining Ltd., <http://www.idmmining.com>). 5
Image 2: “Bear River Valley at Stewart, Portland Canal” in 1910 (Department of Mines 1929). 14
Image 3: View southwest of HcTn-1, surface find location at left (Rescan 2011). 15

List of Tables

Table 1: Sequence of Complex Cultural Characteristics from Tsimshian Territory 8
Table 2: Documented Archaeological Sites within 30 km 13
Table 3: Archaeological Potential of Project Components 16

1 Introduction

IDM Mining Ltd. (IDM) proposes to construct an underground mine on the Red Mountain Gold property, northeast of the District of Stewart. IDM requested that Terra Archaeology Limited (Terra) conduct a preliminary review of the proposed development in order to identify potential conflicts with cultural heritage resources.

1.1 Archaeological Site Protection

An archaeological site is generally defined as a location containing the preserved remains of past human activity (see section 3.4 *Archaeological Site Types* for specific descriptions). Protection for heritage sites, including archaeological sites, occurs automatically under *Heritage Conservation Act* (HCA), Section 13(2) where preserved archaeological remains represent human burials, aboriginal rock art, occupation earlier than 1846 AD, or a ship or aircraft wreck. These sites, whether located on public or private land, cannot be altered in any way without a permit issued under Section 12 or 14 of the HCA.

Automatic heritage protection does not distinguish between disturbed and undisturbed sites or sites which have been documented in the Province's Site Inventory and those sites which have yet to be discovered – all sites described above are automatically protected. In order to identify locations where development may conflict with protected archaeological sites, a professional archaeologist is commissioned to conduct an impact assessment. The impact assessment process typically starts with an office review of the proposed development and documentary evidence of archaeological potential, known as an archaeological overview assessment.

1.2 Archaeological Overview Assessment (AOA)

For the purpose of identifying areas of known or potential cultural concern, Terra's review consists of a desk-based assessment following the standards of an AOA as described in the *BC Archaeological Impact Assessment Guidelines* (the "*Guidelines*", Apland and Kenny 1998). An AOA consists of:

- "background library and records search of ethnographic, archaeological and historical documents pertinent to the study area;
- a statement of archaeological resource potential and distribution in the study area;
- a preliminary assessment of anticipated impacts in light of proposed development plans; and
- recommendations concerning the need for further archaeological impact assessment studies" (*Guidelines*, Section 3.4).

1.3 Report

This report includes a description of the proposed project, the methods of Terra's assessment, a summary of background information, the results of Terra's analysis of available data, and recommendations for further archaeological study.

2 Proposed Project

The Red Mountain Gold property covers 17,125 ha of the Bitter Creek valley and portions of the Cambria Range, east of the District Municipality of Stewart and the British Columbia-Alaska border (Figure 1). IDM proposes to construct an underground gold-silver mine near the head of Bitter Creek and the Bromley glacier. Construction of the mine and associated facilities will commence after completion of preliminary assessments and regulatory certifications, no earlier than late 2016 (IDM 2015).

The proposed mine site is located approximately 4 km south of Otter Mountain, 17 km east of Stewart and 188 km north of the City of Prince Rupert. Proposed access road and powerline rights-of-way connect the mine site to the Stewart Highway (37A) between 6 km and 11 km north of Stewart, following the Bitter Creek valley. Several proposed mine components are assessed here:

- Powerline right-of-way (51 km-long, 25 m-wide)
- Access road right-of-way (44 km-long, 15 m-wide)
- General mine access road rights-of-way (11 km in total, 15 m-wide)
- Mill site (1.78 ha)
- Waste dump site (1.00 ha)
- Tailings dam site (6.69 ha)

From the mine site's location in a cirque below the Cambria Icefield, the proposed powerline and access roads descend a steep slope (the latter by series of switchbacks) to the Bitter Creek valley. From there, both rights-of-way overlap, continuing northwest to the Bear River valley along the east and north sides of Bitter Creek (Figure 2). The proposed access road ends at the intersection with Highway 37A, north of the Bitter Creek bridge, while the powerline right-of-way crosses the highway and continues south for approximately 6 km. Portions of the proposed powerline and access road are located within existing clearings.

The proposed mine site facilities are located above the treeline, and some portions of the mine footprint overlap previously constructed mineral extraction developments, including access roads, test drill locations, and an entrance to a section of previously excavated mine tunnel.

Construction of the powerline and access roads may involve vegetation clearing, cut-and-fill excavation, bridge building and excavation for ditches and utility structures. Deactivation at the end of the project's lifespan may involve other ground altering activities (excavation of deactivation ditches across roads, for instance). Construction at the mine site may involve clearing, levelling and filling, excavation of mine adits, and additional excavation or infilling during project decommissioning. All of these activities have the potential to alter undocumented archaeological sites or objects within the proposed development footprint. Surface features such as culturally modified trees and lithic scatters are particularly vulnerable to vegetation clearing and heavy construction-related vehicle traffic.

The list of proposed project components is based on an independent engineering study by SRK Consulting (SRK 2014). A number of construction options may have been weighed against economic and engineering constraints; there may still be potential for considering additional construction options if significant cultural heritage concerns are identified in this study or in subsequent studies.

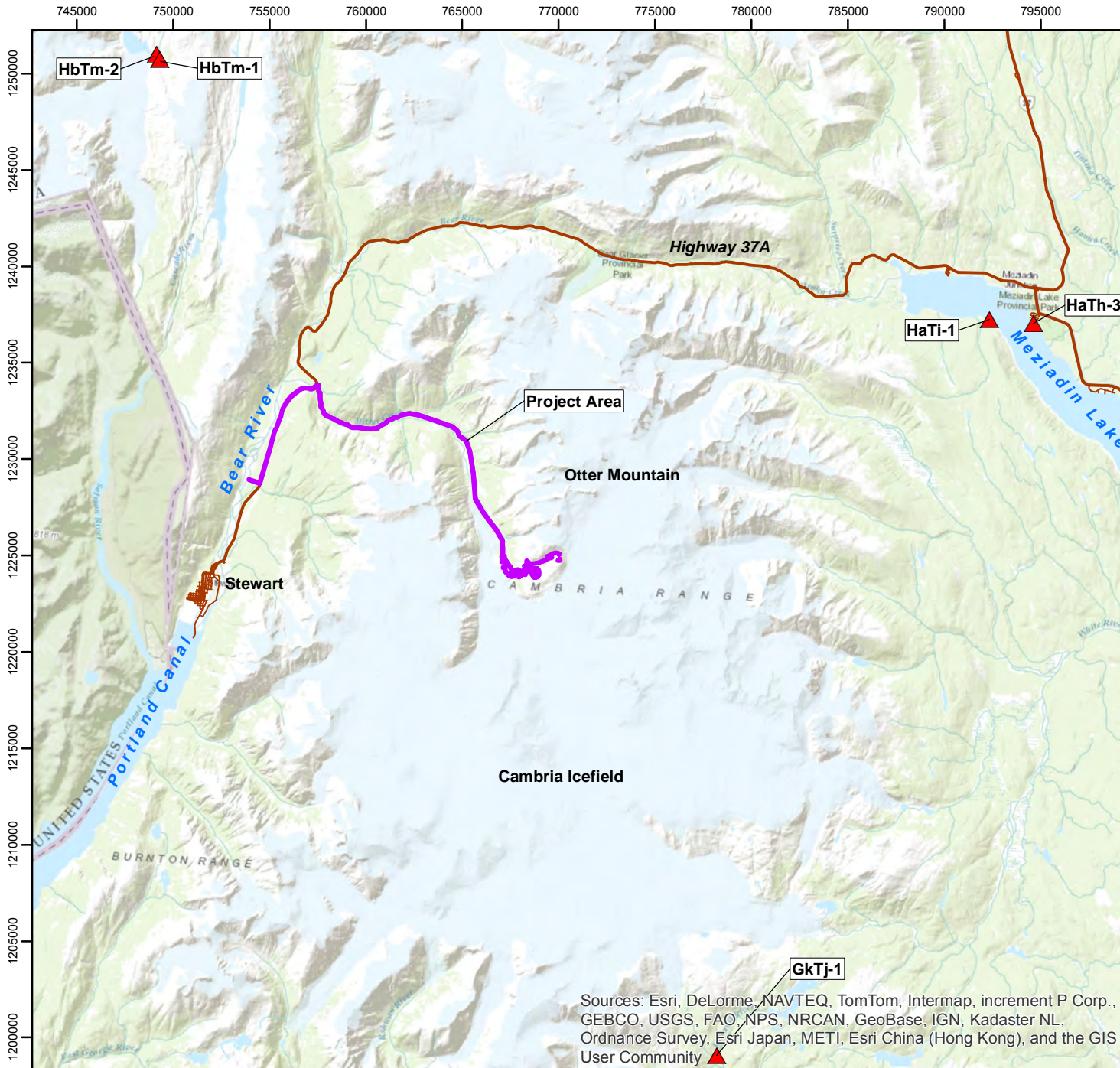
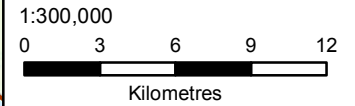


Figure 1. Stewart Area

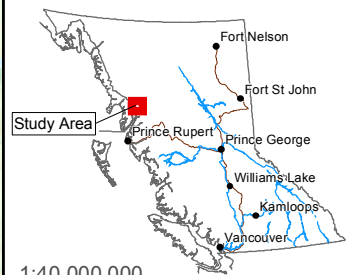
Terra ID: 15-0855-001
Client: Catana Consulting

NTS: 103O, 103P, 104A & 104B
Datum: NAD 1983 BC Albers



- ▲ Archaeological Site
- Project Area
- Highway
- Main Road

Red Mountain AOA



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community ▲

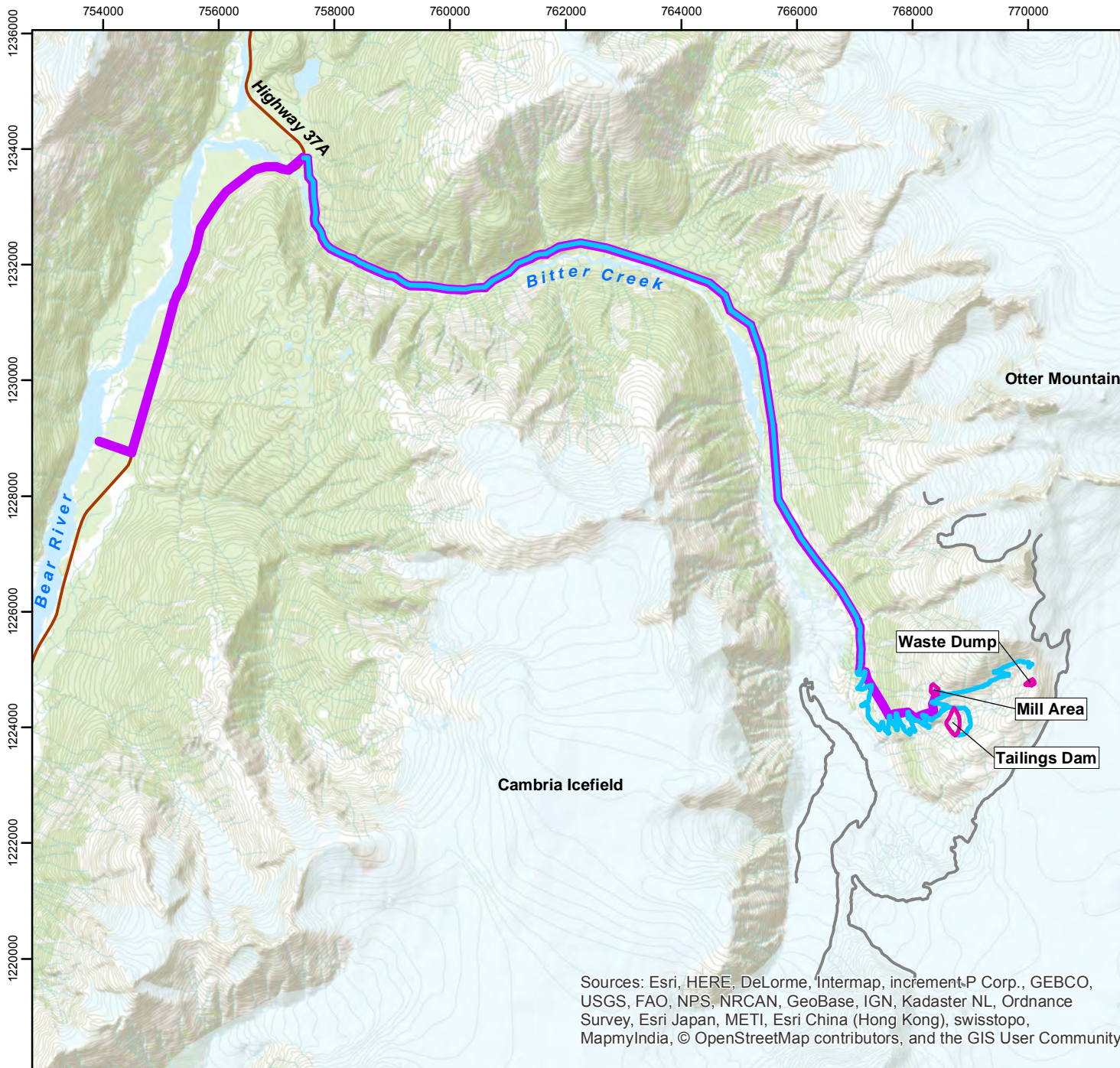
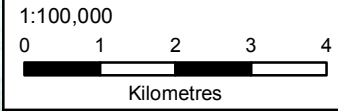


Figure 2. Location of Red Mountain Gold Project Components

Terra ID: 15-0855-001
Client: Catana Consulting

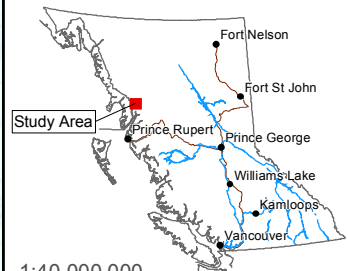
NTS: 103P/13 & 104A/4
BCGS: 103P.091, 103P.092,
104A.001 & 104A.002
Datum: NAD 1983 BC Albers



- Mine Facility
- Powerline
- Road
- Highway
- Current Glacier Margins

Red Mountain AOA

Sources: Esri, HERE, DeLorme, Intermap, increment-P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



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3 Study Area

3.1 Natural Setting

The proposed developments are located in a rugged, mountainous region characterized by large icefields, partially-glaciated alpine tundra, and a distinctly coastal climate (Demarchi 2011; Image 1). Forested zones in this area are typically very wet Coastal Western Hemlock (CWH) or cold and wet Mountain Hemlock (MH); treeless alpine meadows (Coast Mountain-heather Alpine - CMA) are also common.



Image 1: View northeast to Red Mountain (IDM Mining Ltd., <http://www.idmmining.com>).

CMA is a rugged treeless zone, characterized by short cool summers and hardy plants (e.g., various cormous plants, heather, and grasses) and animals (e.g., mountain goats, marmots). Exposed bedrock from receding glaciers is common in this zone, and often occupies the entire zone between the treeline and icefields (MoFR 2006). CWH is a relatively broad zone covering most of the west coast of British Columbia, and is characterized by a very wet, maritime, temperate climate (MoF 1999). This zone covers only portions of the powerline and access roads from the Bear River valley up the Bitter Creek valley to the vicinity of Roosevelt Creek. The subalpine MH zone covers the remainder of the access and powerline rights-of-way. Small scale mapping of biogeoclimatic zones indicates that some of the proposed project components may be covered in a parkland variant of this zone (MHmmp) which attracts a number of foraging animal species such as mountain goat, deer and elk (MoF 1997), all of which are important traditional game animals.

The majority of the powerline and road right-of-ways are located within 200 m of Bitter Creek. Locations close to the creek may be prone to significant flooding; in 2011, heavy rains (over 200 mm in 4 days) caused significant damage to Highway 37A north of Stewart, including a washout at the Bitter Creek bridge (MoTI 2011).

The Ministry of Environment's Habitat Wizard online application indicates that several species of salmon and trout may be present in the Bear River, while Dolly Varden are the only salmonid in Bitter Creek. The latter have been observed upstream to Roosevelt Creek (Royal Oak Mines 1996).

The project components cover a very wide elevation range: the south end of the transmission line right-of-way is located just above sea level (asl) at 35 m, joins the access road at 100 m asl, and climbs the Bitter Creek valley to 700 m asl before ascending to the base of the alpine cirque at 1570 m asl.

Below the mine proper, the terrain is forest-covered, although patches of parkland or meadow are visible on high resolution aerial imagery of the project area, and large sections of the powerline and access road rights-of-way are located in man-made clearings (Figures 3 – 8). A vegetation cover map prepared for the Nass South Sustainable Resource Management Plan (SRMP) indicates that leading species of tree in stands along Bitter Creek include (in order of coverage of the project area) western hemlock, spruce, cottonwood, balsam fir and mountain hemlock (MoF 2008). Yellow cedar, western red cedar, lodgepole pine (all important traditional aboriginal resources species) may also be present within or adjacent to the project area. Two Old Growth Management Areas (OGMAs) are present in Upper Bitter Creek valley adjacent to the proposed access road and powerline rights-of-way.

The mine facilities are located between the end of the powerline right-of-way and the icefield edge at 1870 m asl. Aerial imagery indicates that this entire area is primarily bare rock and gravel (glacial moraine, talus and outwash). The alpine portion of the project area is currently ice free, but may have been glaciated as recently as several decades ago (IDM 2015, Royal Oak Mines 1996). Significant ice would likely have covered the entire mine site 100 – 300 years ago, during a period of global cooling known as the Little Ice Age (Clague and Matthews 1996).

A recent study of Bromley Glacier advances and retreats indicates an advance around 830 BP based on dated wood debris (the remains of an ancient forest) buried in glacial till; and aerial photos reveal that the glacier receded 7318 m up the Bitter Creek valley between 1910 and 2010 (Hoffman and Smith 2013). Retreat of tributary glaciers and adjacent icefield margins would have coincided with Bromley Glacier's recent advances and retreats.

3.2 Cultural Setting

The proposed project is located within the Nass Area (and smaller Nass Wildlife Area), where the Nisga'a have specific rights under the *Nisga'a Final Agreement Act* (1999). Nisga'a territory is centred on the Nass River (*K'ali Aksim Lisims*) and includes the Cambria Ranges, Portland Canal, District of Stewart and the Bear River. In traditional Nisga'a life, eulachon and salmon harvest were important social and economic aspects of society along the Nass River (Halpin and Seguin 1990). The Nisga'a are related through general linguistic, economic and geographic ties to other Tsimshian peoples (living along the Skeena River and coast between the Skeena and Nass Rivers). Tsimshian groups occupied winter villages that were seen as separate political entities which derived their wealth from control of the eulachon oil trade (Halpin and Seguin 1990).

The project area is also adjacent to the traditional territories of the Gitxaala Nation (surrounding the upper Skeena River), which shares kinship ties with the Nisga'a (Halpin and Seguin 1990), and the Tahltan. The Tahltan are an Athapaskan dialect-speaking group whose territories occupy the Stikine River Plateau, an area north of the study area (Albright 1982). Caribou hunting played a central role in traditional Tahltan culture, and the climate in their territory is generally cooler and drier than the project area. While the Tsimshian primarily used boats for travel on the many waterways and coastal inlets within their territory, the Tahltan traversed their territories on foot, although frozen rivers were convenient travel corridors in the winter (Albright 1982).

Franz Boas reported that the original inhabitants of the Stewart area were the Tsetsaut (*Ts'ets'ā'ut*), a people reduced to a population of 12 by 1895 and whose territories around the Portland Canal had come under the protection of a Nisga'a chief (Boas 1895). The Tsetsaut language has many similarities with

Athapaskan, rather than Tsimshian, although the language is only known from Boas's interviews with two informants living among the Nisga'a in the late 1890s. The Skii km Lax Ha First Nation identify themselves as Tsetsaut descendants (Rescan 2014).

3.3 Archaeological Setting

Little archaeological research has been conducted in proximity to the project area, so it is only possible to suggest that archaeological cultures in the area may have possessed traits similar to those better-documented cultures to the north, east and south. However, as noted above, there are significant cultural distinctions between northern-interior peoples and southern-coastal people historically; and so distinctions in archaeological cultures of the two regions are also expected. Because the project is located in an area that appears geographically and biogeoclimatically intermediate, the archaeological setting described here is very broad.

To the north, archaeological research by Albright (1982) among the Tahltan on the Stikine Plateau and Fladmark (1982) in the vicinity of Mt. Edziza form the basis of many subsequent archaeological studies; most are cultural resource management (CRM) surveys. However, the Fladmark work concentrated on documenting some very intensive lithic raw material quarrying activities; Fladmark acknowledges that the sites documented in that study should not be considered representative of the "normal" regional pattern (Fladmark 1982:369). Albright's work focused on documenting current and historic traditional cultural practices among the Tahltan and determining which of these would be visible in the archaeological record. Based on that work, and despite evidence that traditional practices involved significant use of perishable materials (like wood), a wide variety of site types are anticipated in the archaeological record, including: habitation features, quarrying sites, fishing sites and camps re-occupied or re-used, game drives and hunting blinds.

Recently, a significant amount of archaeological work has been conducted on melting ice patches throughout the southern Yukon (Hare 2011, Hare et al. 2012), northwestern British Columbia (Beattie et al. 2000) and elsewhere in the mountains and high alpine of western North America (Lee et al. 2014). Under certain conditions, melting ice patches have revealed well preserved remains of a variety of hunting tools (dart and arrow shafts, including binding sinews and fletchings), clothing, and animal and human remains. The research indicates a relatively intensive use of high alpine settings in the past 9,000 years, and an abrupt change (in the Yukon) from thrown dart to bow and arrow technology after 1200 BP (Hare et al. 2012). Archaeological remains preserved in ice in Alaska, including small mammal and bird arrows, animal snares, bark baskets, and willow boughs (considered to be the remains of a traditional-style lean-to) represent a wide variety of activities that take place in the alpine and in adjacent areas (Vanderhoek et al 2012). This suggests that the potential for ice-patch sites goes beyond locations suitable for ambushing caribou, sheep and goats.

Communal hunting of large game in high alpine settings is well documented in the Colorado Rockies (LaBelle and Pelton 2013) as evidenced by stone hunting blinds (similar to features documented in the British Columbia interior), cairns, and long linear arrangements of stone (game drives). While evidence of such large scale, high-alpine, communal hunting has not been documented in British Columbia, and is unlikely to be documented in the project area, communal hunting of caribou was common among the Tahltan in the fall using brush fences (Albright 1982:82-83).

No cultural chronology exists for the area north of the project area. Fladmark recorded many of the oldest sites in the region, which date to around 5000 BP. A single lanceolate projectile point collected by Rousseau (1990) during an impact assessment of the Eskay Creek Mine is similar to Early period or Palaeoindian points from elsewhere in North America (i.e., 9000 – 7000 BP). The earliest documented sites in British Columbia north of the study area appear to be associated with the use of microblades (Carlson 1990). Older sites (e.g., On Your Knees Cave [9700 – 9900 BP] and Groundhog Bay [approximately 10,000 BP]) have been documented on the islands of Alaska Panhandle west of the study area, but their relationship to human occupation in the vicinity of the study area is tenuous.

In contrast to the scarcity of archaeological research to the north, a number of archaeological studies have focused on documenting archaeological cultures in Tsimshian territory, south of the project area. MacDonald and Inglis (1981) describe the cultural chronology from 5000 BP based on years of archaeological work in the vicinity of Prince Rupert and the lower Skeena River. In this area, winter village sites are characterized by midden deposits, preserved bone and antler remains, items traded from the interior (like obsidian), burials and complex structures. Coupland’s work at sites in the middle Skeena River indicates that an intense prehistoric salmon fishery existed circa 5000 BP, but in many ways the archaeological cultures documented in the Kitselas Canyon are distinct from those closer to Prince Rupert (Coupland 1996). In the period circa 3500 – 2500 BP, archaeological evidence points to strengthening ties between Northwest Coast cultures, including similarities in artifact styles and evidence of trade (Fladmark et al. 1990). However, cultural traits diverge again circa 2000 – 1500 BP across the region, perhaps in response to increasing sedentism (i.e., the establishment of permanent villages, intensification of salmon fisheries, and increasing social complexity; Fladmark et al. 1990:239).

Martindale also presents a summary of archaeological and ethnographic research in Tsimishian territory in his Ph.D. dissertation (Martindale 1999:13). His table summarizing social characteristics of the Prince Rupert-Kitselas Canyon areas is reproduced below (Table 1); although he acknowledges the limited archaeological evidence available for drawing specific comparisons.

Table 1: Sequence of Complex Cultural Characteristics from Tsimshian Territory (Martindale 1999)

Years BP	Prince Rupert Harbour (Coast)	Kitselas Canyon (Interior)
0		Regional Trade (coastal fauna, European goods)*
1000	Warfare (defensive village locations) Lineage Ranking (big houses) Land Tenure (of fishing locations) Slavery (male/female burial ratios)	
2000	Social Differentiation (status items) Control of Trade (exotic imports) Raiding and Violence (traumatic death) Craft Specialization (woodworking)	Social Differentiation (status items)
3000	Sedentism (settlement pattern) Intensification (marine resources) Storage (faunal profile) Population increase (shell middens)	Sedentism (winter village) Intensification (salmon) Storage (cache pits)
4000		
<i>* notes in parentheses indicate archaeological evidence from which characteristics are inferred.</i>		

3.4 Archaeological Site Types

Several types of archaeological sites are likely to be found in the region:

- **Artifact scatters** are sites represented by one or more stone, bone or other organic artifacts. Non-stone artifacts tend to decay rapidly (and therefore are far less common), but can be preserved under the right environmental conditions, such as in ice or waterlogged areas.

Lithic scatters may be found in association with other archaeological features, but are often found in isolation. Lithic scatters are typically formed during the manufacture or maintenance (e.g., sharpening) of stone tools; often all that remains of these activities is a cluster of lithic debitage (small stone flakes). Tools or tool fragments present in some lithic scatters help identify the types

of activities and culture periods represented at these sites. Lithic raw materials were sourced from a wide variety of parent rock including fine-grained volcanics, chert and obsidian.

- **Burials** are locations where the dead are interred. These locations are occasionally marked by rock cairns, although the majority of archaeological burials appear to be unmarked. Other than the presence of cairns and human remains themselves, interments can be identified by earthen mounds, disturbed soil observed in profile (i.e., grave cuts) and grave goods such as bone and stone carvings and shell beads. Burials tend to be located near village sites, but generally all locations with sandy, well-drained soil or locations at the base of talus slopes are suitable for burials.
- **Cultural depressions** may consist of regular circular or rectangular depressions associated with a variety of traditional activities.
 - **Cache pits** are usually identified by their small size (1 m – 2 m diameter), circular form and location on well-drained, although often sloping, sandy or gravelly landforms. Cache pits were used for long-term storage of a variety of food and may be associated with habitation sites or significant resource gathering localities (e.g., fishing spots).
 - **Roasting pits or earth ovens** are usually larger than cache pits (2 m – 6 m diameter) and are characterized by the presence of charred plant remains, heavily oxidized soil and/or large, fire-cracked rock (FCR). After a pit is excavated, a fire is lit at the bottom to heat large cobbles. The fire is extinguished and layers of matting (often coniferous tree boughs) and food (typically either meat or root vegetables) are placed over the hot stones. The pit is then backfilled with soil. Once cooked, the food is exhumed and the pit may be reused or abandoned. Archaeologists typically encounter deep circular depressions adjacent to a toss-zone consisting of large amounts of FCR located to one side of the pit.
- **Culturally modified trees** (CMTs). A wide range of CMT types are expected to be found in this region, which contains numerous species of trees used in traditional ways. In areas where red and yellow cedar trees grow, it is expected that bark-stripped trees will be common, while planked or felled trees (aboriginally logged trees) may also be present. Bark-stripped trees are also to be expected in stands containing lodgepole pine. Other types of CMTs found in the study area include kindling trees (usually conifers) and other tree species which may be bark-strip-harvested for textiles or medicines.
- **Historic sites** are locations consisting of artifacts and structures of non-aboriginal origin (e.g., European). While fur-trade era (pre-1850s) sites might be found in the region, they are likely uncommon in the local area, which did not see any kind of settlement by non-aboriginals until the first miners arrived around the turn of the twentieth century. The remains of placer and underground mine facilities and equipment will be the most common historic site type in the project area.
- **Petroforms** are structures built from loose boulders or cobbles. Cairns are likely the most common petroforms in the study area and may mark burials or significant spiritual sites. This category of site also includes stone hunting blinds and game drives.
- **Petroglyphs and Petrographs**, sometimes collectively referred to as aboriginal rock art, are either carvings or paintings on rock faces. Paintings are typically made with red ochre, and older sites of this type can be difficult to detect without digital image enhancement.
- **Trails** are considered a type of archaeological site when they are associated with traditional, pre-contact land use. In many cases the existence of a trail is inferred from oral history, local knowledge and the presence of related archaeological sites (e.g., CMTs, lithic scatters) along a likely travel corridor. Physical evidence of trails includes blazed trees and distinct trail beds/ruts.

3.5 Historical Setting

Portland Canal was named by George Vancouver while surveying the northwest coast of North America in 1793 (Akrigg and Akrigg 1997), but little information about the area in the historic period is reported for another century. The Klondike Gold Rush may have spurred a renewed interest in north-western British Columbia by non-aboriginals in the early twentieth century. By the turn of the twentieth century, mining claims were being staked in the vicinity of Stewart, the Bear River, American Creek and Bitter Creek. The communities of Stewart and Premier were both established between 1900 and the 1920s. Mining, along with the local population, declined in the latter half of the twentieth century and the population of Stewart is now approximately 500 (2011 Census), while Premier is abandoned.

4 Methodology

This study consists entirely of a desk-top review of existing archaeological site records, past archaeological work in the vicinity of the project area (or in similar cultural-environmental settings), historic land use in the vicinity of project area, and current topographical and environmental data for the project area.

4.1 Documentary Research

4.1.1 Provincial Archaeological Report Library and Permit Report Review

The Provincial Archaeological Report online Library (PARL) contains all reports submitted to the Province's Archaeology Branch (and its predecessors) summarizing archaeological studies conducted under Heritage Conservation Act permits and ministerial orders. Both report texts and bibliographic entries (abstracts) were searched for keywords, such as the names of local topographic features, mining sector proponent names, and archaeological site numbers. PARL research substituted for in-person documentary research at the Archaeology Branch where hard copies of permit reports are stored.

Permit reports for archaeological impact assessments were reviewed for background information and the results of in-field surveys of similar environmental settings. The methods for selecting locations within study areas for subsurface testing and the results of this testing and surface examination were considered in the context of the current project setting. Report authors' recommendations for future archaeological study, including the refining methods for assessing archaeological potential were noted.

4.1.2 Remote Access to Archaeological Data and Heritage Resource Inventory Application

The Archaeology Branch's Remote Access to Archaeological Data (RAAD) application was used to search for documented archaeological sites over a wide area surrounding the project area. RAAD displays archaeological site locations on a map, and site records can be selected by manually delineating a search area or by a set distance from a particular point, line or polygon. Sites within 30 km of the project area are listed in section 5.1 *Documented Archaeological Sites and Trails*; however, a wide range of site records were reviewed.

A GIS-based archaeological potential model, *The Kalum Forest District Archaeological Overview Assessment*, has been developed for the area overlapping the project lands, but it could not be viewed at the time of this assessment (i.e., it is not visible on RAAD). However, a report summarizing the potential modelling process (Eldridge *et al.* 1995) was reviewed. In addition, the adjacent *Cassiar-Iskut-Stikine LRMP Archaeological Overview Assessment* model final report (Fisher *et al.* 1998) was also reviewed.

The Branch's Heritage Resource Inventory Application (HRIA), which delineates study areas covered by permitted archaeological assessments, in addition to archaeological site boundaries, was searched as a means of augmenting both PARL and RAAD search results.

A list of archaeological sites documented in the region considered most relevant to the current study was compiled and analyzed for the purpose of determining which sites are most likely to be found in the study area and which field methods are to be used to identify these site types. The site search results were also reviewed to determine the likelihood of sites of any kind being located anywhere in the Bitter Creek valley and mine site area.

4.1.3 Northwest British Columbia Mining Industry Documents Search

A search for documents related to the Red Mountain Gold property and mining in the region was made using a basic internet search and specific online tools, such as the Environmental Assessment Office's Project Information Centre (e-PIC), and the Ministry of Energy and Mines' Annual Report Catalog and MINFILE Mineral Inventory. The results of these searches were reviewed and a description of local mining and other development activities was compiled for the project area.

4.2 Review and Analysis of Topographical Data

IDM provided Terra with a variety of spatial data and aerial imagery for the project area, including:

- Polygons delineating all project facilities (see section 2 *Proposed Project*).
- Elevation data (1 m contours)
- Creek lines
- Existing roads, buildings and infrastructure (lines)
- Treeline (lines delineating edge of forest cover, including man-made clearings)
- Current glacial margins (lines)

The 1 m contour data was used to produce a digital elevation model (DEM) for the entire project area, except the portion of the powerline right-of-way south of Bitter Creek. Slope angle was calculated for 10 m by 10 m cells, and slope aspect was calculated for 50 m by 50 m cells over the entire project area. Slope angles were divided into five ranges (0-2°, 3-5°, 6-10°, 11-15° and ≥16°); cells with slope angle values less than 16° were plotted on aerial images within the development boundaries. Slope aspect, forest and glacier coverage, and the location of creeks were considered subjectively and integrated into overall descriptions of archaeological potential.

Figures 3 through 7 are 1:10,000 scale maps centered on the locations within the project boundaries that have low slope values. Portions of the project area with steeper slopes between the mine site and the mouth of Bitter Creek may not be depicted on these maps.

4.3 Archaeological Potential

Notwithstanding any special considerations based on the review of region-specific archaeological data, determining archaeological potential was strongly influenced by factors such as proximity to water, availability of food or material resources, slope, drainage, forest cover, and the presence of terrain features with known associations to archaeological sites (e.g., terraces, knolls, breaks-in-slope). Grades of archaeological potential determined in this study (low, low-moderate, moderate and high-moderate) are subjective, and reflect a combination of high potential factors (such as level ground) as well as restricting factors (such as past land-use disturbance) rather than an objective “score” based on such factors. Likewise, archaeological potential is assigned to broad areas of the project footprint, rather than to specific polygons, which might restrict future ground-truthing phases of the impact assessment.

4.4 Recommendations

Lastly, recommendations for further archaeological study were made based on the nature and distribution of archaeological potential within the project area. Further archaeological work may involve ground-truthing portions of the project area (preliminary field reconnaissance / PFR), testing for buried archaeological remains or evaluation of identified archaeological sites (archaeological impact assessment / AIA), or conducting further research in order to evaluate potential impacts to cultural heritage sites (such as research or interviews in local communities).

5 Results

5.1 Documented Archaeological Sites and Trails

Only five documented archaeological sites are located within 30 km of the Red Mountain Gold Project (Table 2).

Table 2. Documented Archaeological Sites within 30 km

Site Number	Site Type	Setting Description	Elevation (m asl)	Distance from Project (km)
HbTm-1	Andesite flakes	Sloping area adjacent to an unnamed creek and wetland	915	18
HbTm-2	Aircraft wreck – movie set (modern)	Heavily disturbed, rocky, subalpine meadow	890	19
GkTj-1	Bark-stripped western red cedar (CMTs)	Steep, densely forested terrain near the confluence of Homestake Creek and the Kitsault River	430	27
HaTh-3	Cultural depressions	Unnamed island on Meziadin Lake reported to contain burials	250	28
HaTi-1	Obsidian flake	Cutbank adjacent to Meziadin Lake	245	25

These sites represent a range of site types, and even indicate some of the trends in the distribution of particular site types in the region described elsewhere (e.g. Eldridge et al. 1995). That is, culturally modified trees and cultural depressions – associated with habitation, trails and subsistence – are situated in low elevations settings, and lithic scatters are found in a variety of settings, including at higher elevations.

Aboriginal trails, in particular grease trails (a term used to describe the network of trade routes based on the exchange of rendered eulachon oil) are important features in this region as they connected cultural groups and seasonal villages, and provided routes for exchange of goods (Mt. Edziza obsidian, for instance (Fladmark 1982, Martindale 1999)). Historically, the Work Channel Trail followed the Bear River through the west part of the project area, connecting Tsimishian winter villages near the mouths of the Skeena and Nass Rivers to the Stikine Trail at Meziadin Lake (MacDonald and Cove 1987, in Martindale 1999 and Rescan 2010).

5.2 Historical Records Search

In May 1898 a large group of prospectors from Seattle arrived at the head of Portland Canal with plans to search for placer mining potential near the source of the Nass River. A few of that party overwintered in the local area and staked the first claims in the Portland Canal District in 1899 on Bitter Creek (Minister of Mines 1907:62). The Minister of Mines report for 1900 indicates that attempts were made to build a permanent trail up the Bear River valley from the head of Portland Canal earlier that year, but were suspended due to difficulties in construction “and some other slight difficulties which unexpectedly cropped up” (Minister of Mines 1901:790). By 1906 regular steamship service to Stewart had been established from Vancouver and Port Simpson (*Lax-Kw’alaams*; Minister of Mines 1907), although no road had yet been built up the Bear River valley.

By the 1920s mining activities in the Portland Canal District in the vicinity of the Bear River were rapidly increasing. Claims in the Bitter Creek valley as far upstream as Hartley Gulch were being explored, including the excavation of two tunnels (reportedly at 1,045 m and 1,065 m elevation), and numerous surface exploration excavations (Department of Mines 1929). Permanent roads had been constructed several miles up the Bear River valley, short line railway sections constructed closer to Stewart (Image 2), and aircraft were being used to ferry personnel, supplies and equipment between Stewart and Bowser Lake (Department of Mines 1929). In the Bitter Creek valley, by the 1930s “a good pack-horse trail extends from the road at elevation 450 feet to the cabin at elevation 1,500 feet” (likely past Hartley Gulch at 450 m asl; Minister of Mines 1936).



Image 2: “Bear River Valley at Stewart, Portland Canal” in 1910 (Department of Mines 1929).

Work on the Bitter Creek claims appears to have diminished after the 1930s, although work in the mining district continued at a steady pace elsewhere (e.g., Mitchell 2000). The lower Bitter Creek claims went through a series of ownerships in the late 1950s, 60s and 70s; prospecting and tunnel excavation continued during this period in the vicinity of Roosevelt and Radio Creeks (Tully 1979).

Exploration of the Red Mountain Gold property didn’t begin until 1989 and continued with the excavation of a tunnel in 1993 and 1994 (Royal Oak Mines 1996:4).

5.3 Recent Archaeological Studies

Recent archaeological studies discussed below include only those studies where HCA permit reports have been published on PARL. No report was available for Permit 2011-0245 (Rescan’s assessment which identified sites HbTm-1 and HbTm-2) or for Prince’s 2007 non-HCA permitted *Reconnaissance Survey at Meziadin Lake*, which identified archaeological sites HaTh-3 and HaTi-1.

5.3.1 AIAs of Ministry of Transportation and Infrastructure Gravel Pits, Permit 2008-0181

Archer’s 2009 assessments of two gravel pits are the closest modern archaeological surveys near the project area (Jackman and Craig 2011). Bitter Creek Quarry is located immediately south of Bitter Creek on the east side of Highway 37A. The majority of the proposed quarry was observed to have been previously logged, and characterized by steep and unstable (rocky) terrain, which indicated low archaeological potential.

American Pit is located east of Highway 37A, adjacent to the confluence of American Creek with the Bear River. Most of the proposed pit area had been impacted to some extent by mineral and gravel exploration activities and logging. Forest cover was older second growth western hemlock and the understorey was relatively open. The Archer crew excavated subsurface tests along the edge of a terrace overlooking an unnamed creek, with negative results.

Overall, the impression from these assessments is that archaeological potential is lower than expected from desk-based assessments due to historic land use. Potential for CMTs is very low. Some locations with potential for buried archaeological remains exist near drainages.

5.3.2 AIA of Bravo Gold Corp.'s Homestake Ridge Access Road, Permit 2010-0274

Located approximately 20 km south of the project area on the south slope of the Cambria Range, the Homestake Ridge Access Road was observed to be situated on primarily steeply sloping terrain which had been moderately impacted by past developments associated with the Dolly Varden Mine (Harrison 2010). Despite the past disturbance from mine development, four locations considered to have potential for buried archaeological remains were tested, and three western hemlock CMTs were recorded (site GkTj-1). Archer's assessment also indicated that the alpine areas around the head of Homestake Creek had high potential for surface features (such as stone hunting blinds and rock shelters) and preserved remains of hunting weapons, although none were observed.

5.3.3 AIA of Pretivm Resources Inc.'s Snowfield and Brucejack Project, permit 2010-0255

Rescan's assessment of the Snowfield and Brucejack Mine Project resulted in the identification of only one archaeological site (HcTn-1). While this project is located over 40 km north of the project area, it covers similar environmental settings to the project. The Snowfield-Brucejack AIA involved survey from lowland valley areas to recently deglaciated alpine areas (Rescan 2011). A total of 861 shovel tests were excavated in a variety of settings, including forested riverine terraces and subalpine meadow, with negative results. Site HcTn-1 consists of a single piece of obsidian debitage, sourced to Mt. Edziza, identified on the ground surface at 1,376 m asl, approximately 80 m north of Brucejack Creek (Image 3; Rescan 2011:5.1).



Image 3: View southwest of HcTn-1, surface find location at left (Rescan 2011).

5.4 Terrain Analysis

Slope angles were calculated for the entire project footprint, then large angles (greater than 15 degrees) were filtered out. The remaining slope angles were divided into four categories which are depicted in Figures 3 through 7. The slope analysis gives a preliminary indication of level or gently sloping areas adjacent to Bitter Creek and locations where the powerline/access road right-of-way crosses its tributaries. That is, locations that have moderate to high archaeological potential for buried archaeological remains such as lithic scatters. Slope angles may also indicate locations that have been artificially levelled, so some careful interpretation is needed when viewing the analysis results.

5.5 Archaeological Potential

Archaeological potential is estimated for the entire project area considering the types of archaeological sites listed in section 3.4 *Archaeological Site Types*, and the information described in the preceding subsections in 5 *Results*. The results of the potential assessment are listed in Table 3.

Table 3: Archaeological Potential of Project Components

Location	Map Reference	High Potential Factors	Restricting Potential Factors	Archaeological Potential
Waste Dump	Figure 3	Receding ice; Alpine	Very steep slope; Possible mining disturbance	Low
Mill Area	Figure 3	Alpine; Partly level terrain	Mostly steep slope; Mining disturbance	Moderate
Tailings Dam	Figure 3	Alpine; Partly level terrain	Mostly steep slope; Mining disturbance	Moderate
Mine Site Access	Figure 3	Receding ice; Alpine	Steep slope; Road construction	Low-Moderate
Powerline (Mine Site)	Figure 3	Alpine	Steep slope; Mining disturbance	Low
Powerline/Access (Goldslide–Rio Blanco)	Figure 3	None	Very steep slope; Road construction	Low
Powerline/Access (Rio Blanco–Hartley Gulch)	Figure 4	Possible veteran CMTs; Level areas near creek	Mostly steep slope; Road construction	Moderate
Powerline/Access (Hartley Gulch–Roosevelt)	Figure 5	Possible veteran CMTs; Level areas at creek crossing; Possible terrace near creek	Mostly steep slope; Road construction	Moderate-High
Powerline/Access (Cable–Crabtree)	Figure 6	Possible terrace near creek	Mostly steep slope; Mining disturbance; Road construction	Low-Moderate
Powerline/Access (Highway 37A Junction)	Figure 7	Possible terrace near creek	Mining disturbance; Road construction; Logging	Moderate
Powerline (Highway 37A to Stewart)	Figure 8	Possible river terraces	Significant road construction; Powerline construction; Poorly drained areas; Logging	Low-Moderate

Generally, the mine proper has moderate or low-moderate archaeological potential, primarily due to recently receded ice which may have exposed artifacts deposited there in the past. Archaeological research indicates that artifacts deposited in the alpine represent a wide variety of activities, not just alpine hunting; without additional ethnographic or ecological data about the area around the Red Mountain Gold property specifically, it is impossible to completely dismiss the potential for archaeological sites on the cirque where the mine is located. On the other hand, the area is steeply sloping overall and the surface appears to be heavily eroded by glacial outwash channels, and disturbed in parts by previous mineral exploration and road building activities (Figure 3).

The proposed powerline and access roads overlap previous clearings from road/trail building in the early twentieth century, at least as far upstream as Hartley Gulch. The presence of large existing clearings significantly reduces the probability that culturally modified trees are present within the rights-of-way. Slope modelling indicates that there are several level or gently sloping sections between Rio Blanco Creek and Hartley Gulch (Figure 4).

In the vicinity of Roosevelt Creek and lower in the Bitter Creek valley, significant ground disturbance from past mining and mineral exploration activities likely affects the archaeological potential to a greater degree than elsewhere. Slope modelling here may reflect some artificial levelling. However, given that Roosevelt Creek is a significant drainage and that the low slope grades are widespread in this area, some level areas associated with natural terraces overlooking Bitter Creek are anticipated here (Figure 5). Unfortunately, significant alteration to the landscape from large-scale floods reduces the potential for intact archaeological deposits close to the creek.

Across from Cable, S.D. and Crabtree creeks are several locations with level to gently sloping terrain. While these locations are possibly associated with alluvial fans and artificial levelling for access roads and mine facilities, some remnant terraces may exist here (Figure 6).

At the Highway 37A junction, disturbance from past land use is likely greater than anywhere else in the Bitter Creek valley, as reported by Archer during their assessment of the Bitter Creek Quarry (section 5.3.1 *AIAs of Ministry of Transportation and Infrastructure Gravel Pits, Permit 2008-0181*; Jackman and Craig 2011). However, remnant creek terraces with potential for buried, but likely disturbed archaeological deposits may also exist here (Figure 7). Beyond this point, the powerline right-of-way continues south, mostly within existing clearing. While some remnant terraces may exist adjacent to the Bear River within this section of right-of-way, disturbance from road building, highway construction, powerline construction, gravel extraction and other past land uses will make it challenging to identify natural landforms.

6 Conclusions and Recommendations

The results of this overview assessment indicate that the majority of the proposed project footprint has low archaeological potential due to steeply sloping or heavily disturbed (due to past land use or natural processes) terrain. The review also indicates that there are no old growth stands of cedar or lodgepole pine within the project area (although old growth stands of other species are nearby), so the potential for culturally modified trees is predominantly low. There are no previously recorded archaeological sites located within the Bitter Creek valley, or adjacent portions of the Bear River valley, and overall the distribution of archaeological sites in the region is very sparse.

However, our understanding of the distribution of high alpine sites and the methods for identifying them are relatively new, and given the recent deglaciation of the mine site, there may be an opportunity to search for ice patch hunting sites. The potential for these sites is tempered by the knowledge that the main focus of this type of hunting, caribou, has not been reported in this area historically.

Lastly, the trend in development-driven archaeological assessments in the last decade of more intensive subsurface testing in a wider variety of environmental settings has led an understanding that buried archaeological sites are located in relatively marginal areas. Also, disturbed contexts are no longer being dismissed as having low archaeological potential, as even displaced artifacts are protected equally by legislation. In this context, the possibility of natural landforms remaining in areas adjacent to Bitter Creek and its tributaries means that some further assessment of these locations is warranted.

- 1) It is recommended that **a preliminary field reconnaissance is conducted for sections of the proposed access and powerline rights-of-way that are modelled as level- to gently-sloping (<10° or <17% slope)**. A sample of these areas may be examined, and if the results indicate that they have low archaeological potential, the assessment of the remaining areas may be discontinued.
- 2) It is recommended that construction of the powerline right-of-way south of the Highway 37A junction be restricted to existing rights-of-way (highway or existing powerline); **a preliminary field reconnaissance is recommended for the entire powerline right-of-way south of Bitter Creek**, although our expectation is that well-drained, remnant river terraces will be relatively uncommon (but not entirely absent).
- 3) It is recommended that **a preliminary field reconnaissance is conducted over all facilities at the proposed mine site** other than the proposed waste dump site.

This assessment addresses the potential for the existence of physical evidence of past human activity and does not encompass traditional use or other heritage concerns of the First Nation communities. This information should be solicited directly from the First Nations.

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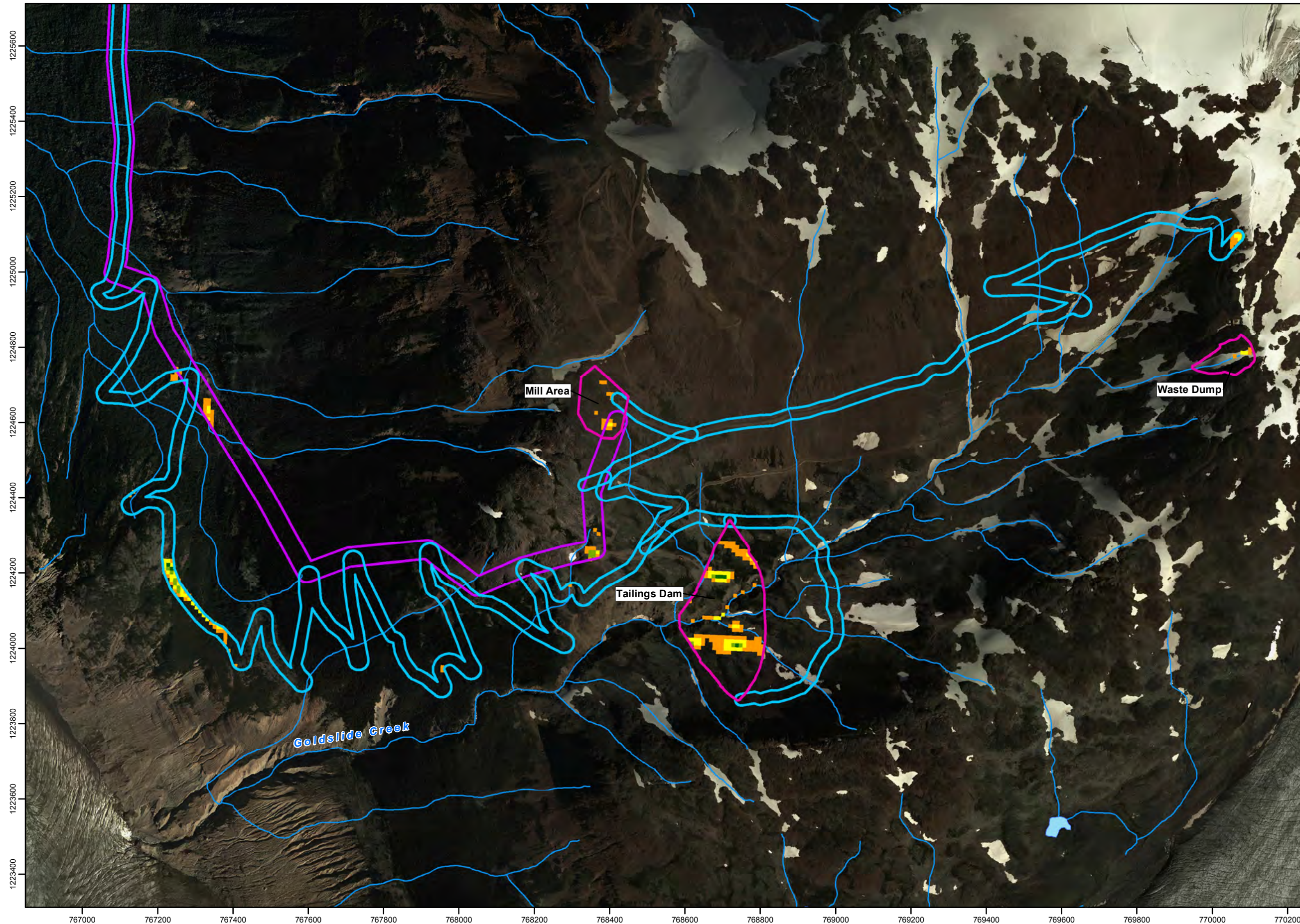


Figure 3. Red Mountain Gold Project – Mine Facilities

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Client: Catana Consulting

NTS: 103P/13
BCGS: 103P.092
Datum: NAD 1983 BC Albers

1:10,000
0 100 200 300 400
Metres

- Mine Facility
- Road
- Powerline
- River/Creek
- Waterbody

Slope (Degrees)

- 0 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16+

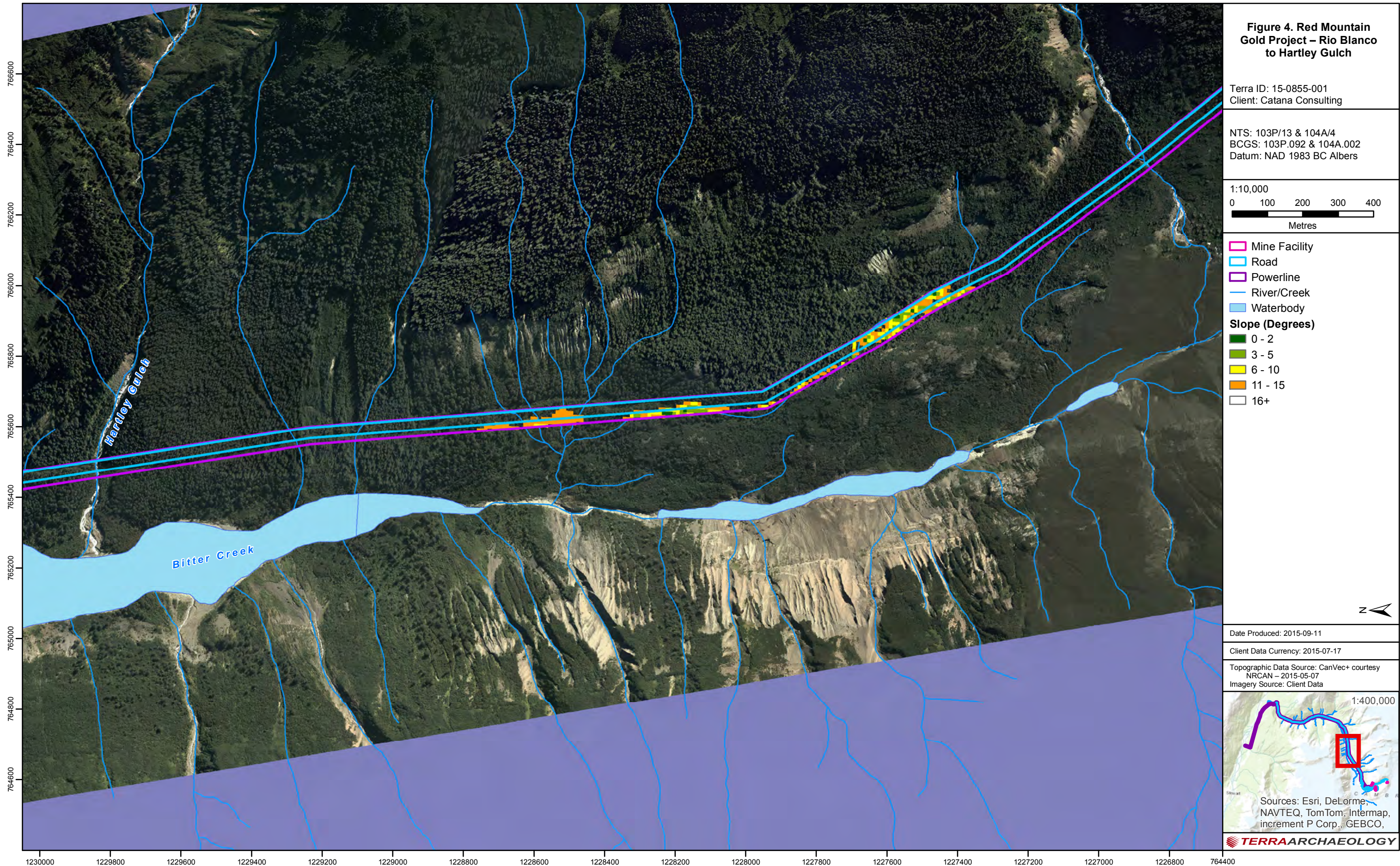
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Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO,

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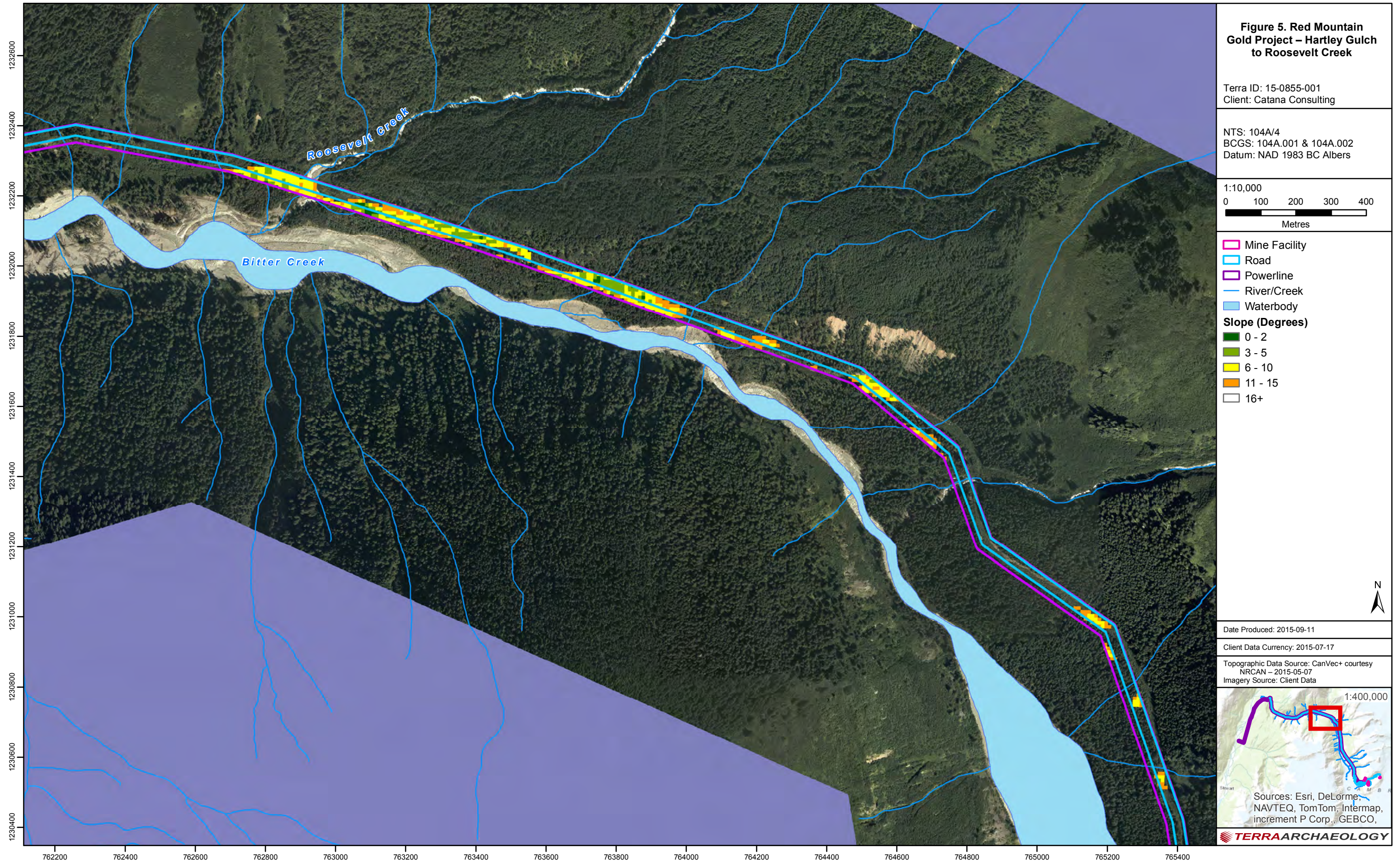


Figure 5. Red Mountain Gold Project – Hartley Gulch to Roosevelt Creek

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Client: Catana Consulting

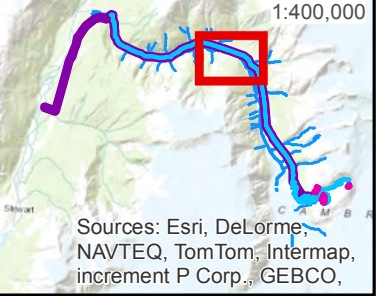
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BCGS: 104A.001 & 104A.002
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Metres

- Mine Facility
- Road
- Powerline
- River/Creek
- Waterbody
- Slope (Degrees)**
- 0 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16+



Date Produced: 2015-09-11
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Topographic Data Source: CanVec+ courtesy NRCAN – 2015-05-07
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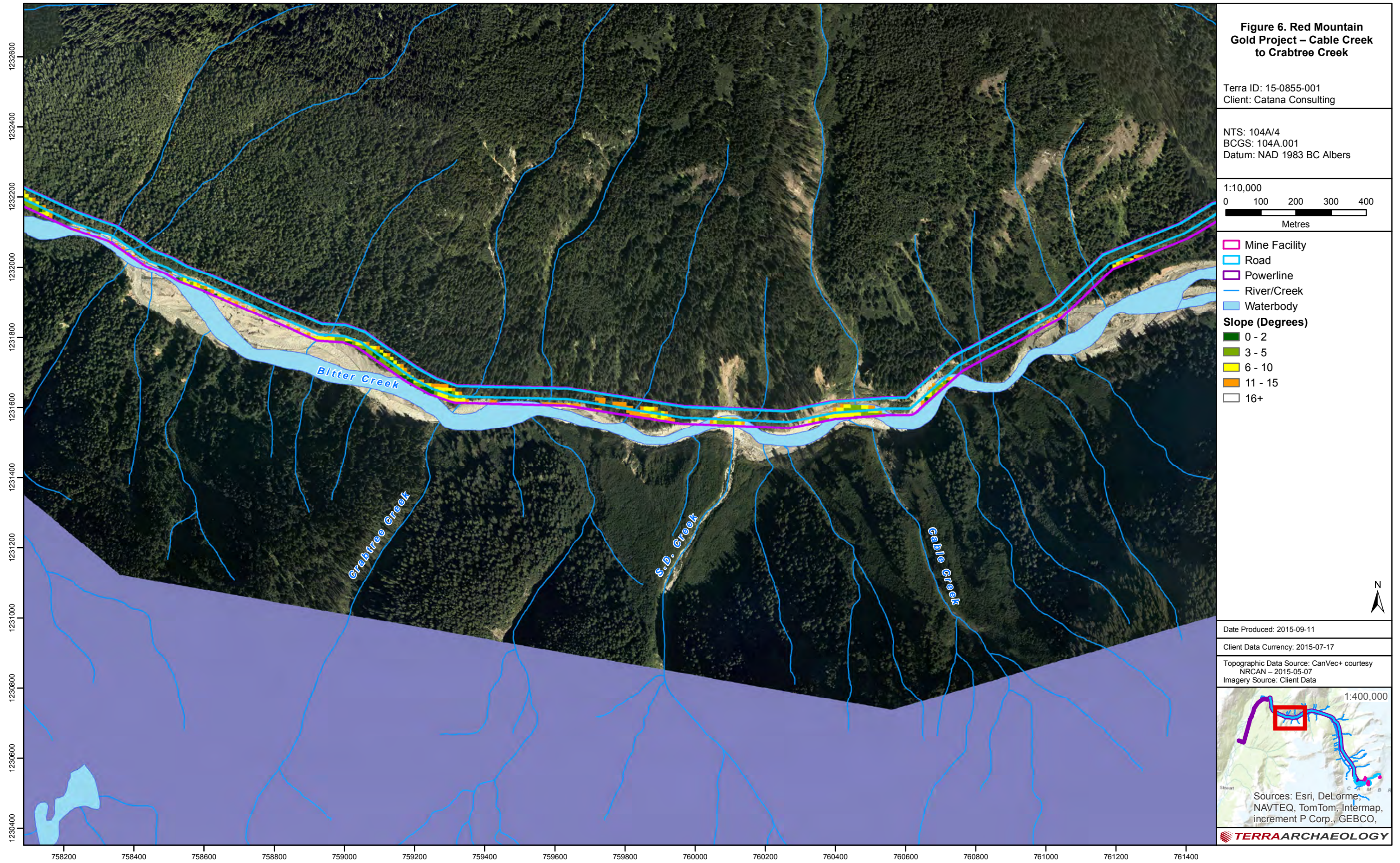


Figure 6. Red Mountain Gold Project – Cable Creek to Crabtree Creek

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Client: Catana Consulting

NTS: 104A/4
BCGS: 104A.001
Datum: NAD 1983 BC Albers

1:10,000
0 100 200 300 400
Metres

- Mine Facility
- Road
- Powerline
- River/Creek
- Waterbody
- Slope (Degrees)**
 - 0 - 2
 - 3 - 5
 - 6 - 10
 - 11 - 15
 - 16+

Date Produced: 2015-09-11
Client Data Currency: 2015-07-17
Topographic Data Source: CanVec+ courtesy NRCAN - 2015-05-07
Imagery Source: Client Data

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Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO,



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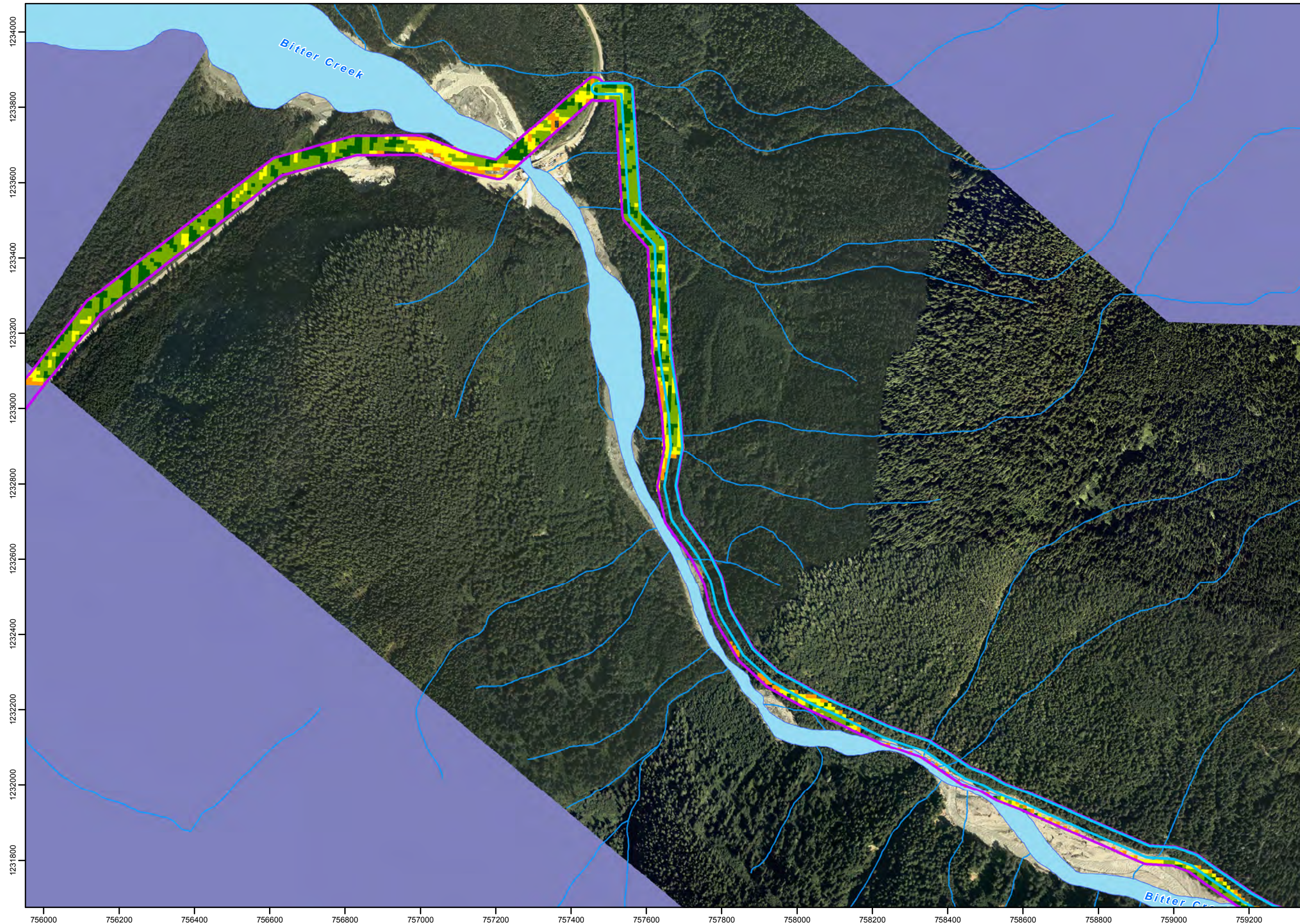


Figure 7. Red Mountain Gold Project – Highway 37A Junction

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Client: Catana Consulting

NTS: 104A/4
BCGS: 104A.001
Datum: NAD 1983 BC Albers

1:10,000
0 100 200 300 400
Metres

- Mine Facility
- Road
- Powerline
- River/Creek
- Waterbody

Slope (Degrees)

- 0 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16+

Date Produced: 2015-09-11
Client Data Currency: 2015-07-17
Topographic Data Source: CanVec+ courtesy NRCAN – 2015-05-07
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Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO,

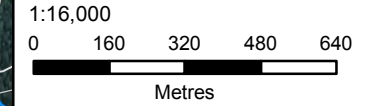
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Figure 8. Red Mountain Gold Project – Highway 37A to Stewart

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Client: Catana Consulting

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BCGS: 103P.091 & 104A.001
Datum: NAD 1983 BC Albers



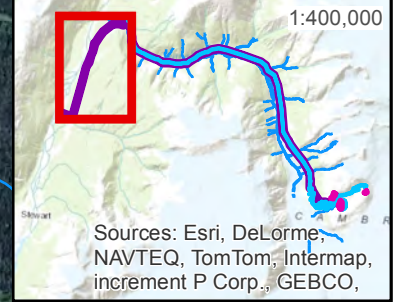
- Mine Facility
- Road
- Powerline
- Contour
- River/Creek
- Waterbody



Date Produced: 2015-09-11

Client Data Currency: 2015-07-17

Topographic Data Source: CanVec+ courtesy
NRCAN – 2015-05-07
Imagery Source: Client Data



Sources: Esri, DeLorme,
NAVTEQ, TomTom, Intermap,
increment P Corp., GEBCO,



1234000 1233500 1233000 1232500 1232000 1231500 1231000 1230500 1230000 1229500 1229000

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